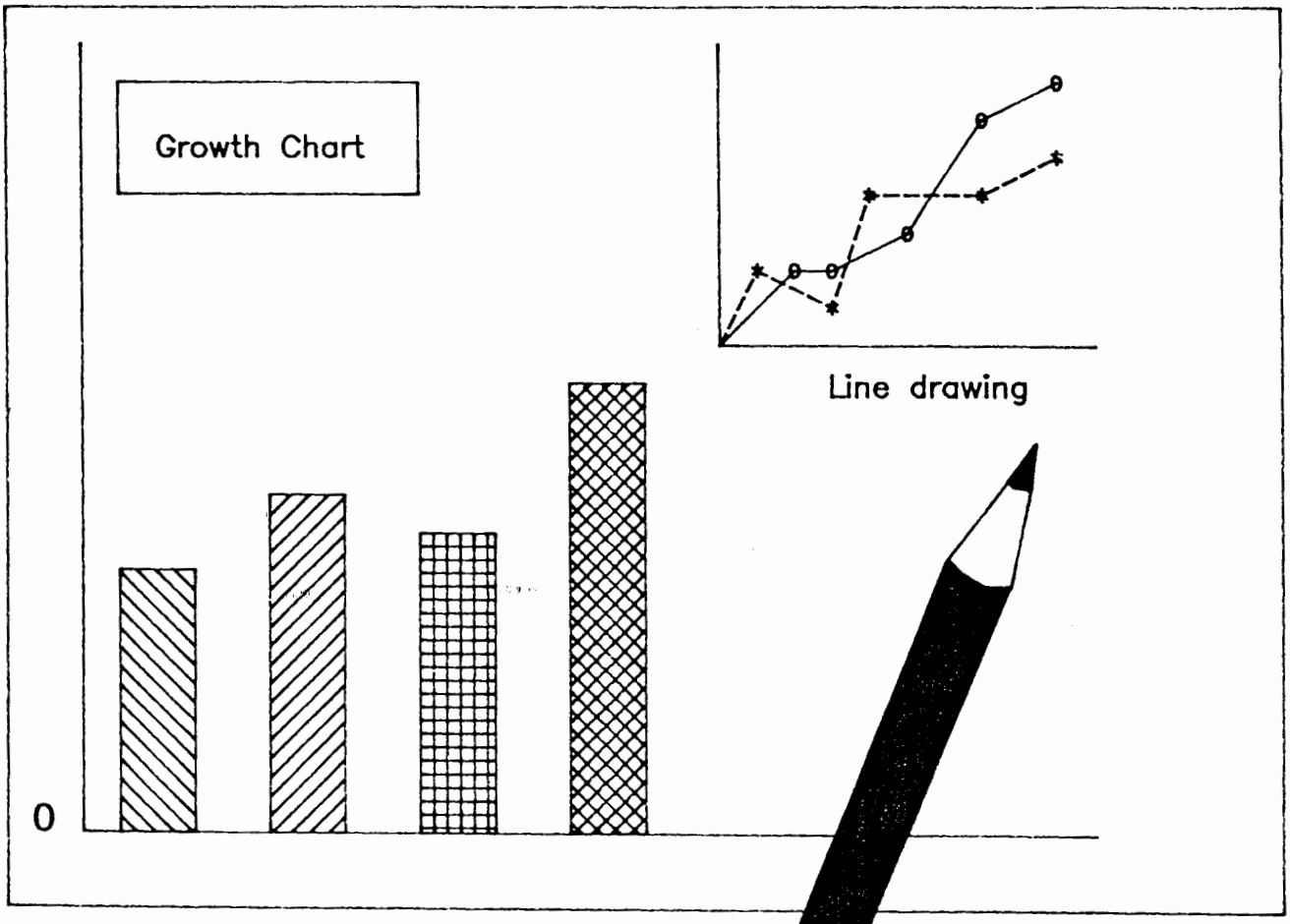
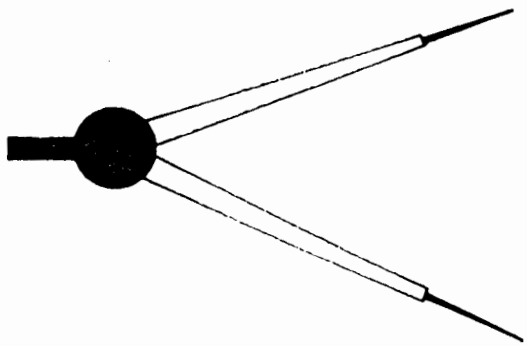
GEMINI MICROCOMPUTERS.

GSX *Graphics Supplement*





Issue 1

June 1985

TABLE OF CONTENTS

1. The Gemini GSX Supplement

This document is supplied as a supplement to the Digital Research (DR) Graphics System Extension (GSX) package. It gives details of the additional software that Gemini has developed as an extension of that supplied as standard by DR. The extra software is included on your GSX master disk and comprises GSX device driver software for the Pluto colour card and some popular pen plotters currently in use in the UK.

A section has also been included on the installation of GSX with application programs. The Digital Research drawing package DR DRAW makes reference to 'The supplement' when referring to installation details. Please refer to 'Application programs' for installation details not only for DR DRAW but any other program requiring the GSX graphics interface.

This document is intended as a supplement to the Digital Research publications 'The GSX-80 Users Guide' and 'The GSX-80 Programmers Guide', and gives details specific to the Pluto GIOS. The concepts and philosophy behind GSX is not discussed here as these subjects are covered in the Digital Research manuals. No details are given on the device drivers that are supplied to you by DR.

2. Your GSX Master Disk

On receipt of the GSX 80 master disk first check that it contains the following files:

a) Supplied by DR (See DR GSX documentation for details.)

DDANADXM.PRL, DDCITOLR.PRL, DDCNTXM.PRL, DDDS180.PRL, DDFXHR8.PRL, DDFXLR7.PRL, DDFXLR8.PRL, DDHP7470.PRL, DDIDSM.PRL, DDLA100.PRL, DDLA50.PRL, DDOKI84.PRL, DDPMVP.PRL, GENGRAF.COM, GSX.SYS.

b) Supplied by Gemini.

1. DDPLUT/K.PRL — The Pluto keyboard driven device driver.
2. DDPLUT/P.PRL — The Pluto Digitiser driven device driver.
3. DDPLUT/M.PRL — The Pluto Mouse driven device driver.
4. PCONF.COM — The configuration program for the above.
5. DDPIXY3.PRL — A device driver for the Mannesman Tally PIXY3, 3 pen flatbed plotter.
6. DDMP1000.PRL — A device driver for the Graphtec MP1000 6 pen flatbed plotter.
7. DDDXY880.PRL — A device driver for the Roland DXY-1000 8 pen flatbed plotter.
8. ASSIGN.SYS — A sample copy of this file.

If one or more of these entries are not present please return your master disk to your dealer and report the omission.

It is essential at this stage to make a copy of the original master disk so that, in the event of an accident, there is at least one copy of the disk in your posession.

To make a copy of the master disk you should use the utility programs BACKUP.COM, PIP.COM, or SWEEP.COM depending on which you prefer. It is generally recommended that the contents of an original master be transferred to a second disk which becomes a working master. The contents of the working master should then be transferred to a third disk which becomes your actual working copy. The original master is thus only used once and should then be stored away in a locked container. Should it become necessary to recreate the working copy this should be done from the working master.

3. Applications Programs

If you intend to use a ready to run program supplied to you on a master disk please read the preceding section on the creation of working master disks and the protection of original master disks.

The following section will outline the stages necessary in the creation of a working applications program disk. On completion you will have a disk containing all the necessary GSX components required to sucessfully run the program.

The following process describes the creation of a working floppy disk. As an example let us use the fictitious program filename GSXPROG.COM which we wish to run using the various components of GSX and a Pluto device driver.

The GSXPROG source code has been compiled into .COM form to give an executable program in the normal fashion. It has also been run through the GENGRAF utility program which has informed it that GSX function calls will be made from it.

If the program has been supplied in a .COM format, as in the case of DR DRAW & DR GRAPH it is not necessary to use the GENGRAF program.

Taking a blank, formatted floppy disk we first transfer GSXPROG.COM to it using the PIP utility. As a point of interest, if you wish to use large programs such as DR DRAW it will also be necessary to transfer all the overlay files, text files and character fonts associated with it.

We now need to place a copy of the file GSX.SYS onto the disk. GSX.SYS can be found on the GSX-80 master disk. This file contains code, which when executed, creates the GSX graphics interface that will later handle the running of the device drivers.

If you intend to use the Pluto colour card, choose which of the three supplied Pluto drivers you wish to use and transfer it onto your disk. Also transfer the PCONF.COM program which when run informs the Pluto driver of the type of hardware that you will be running it on. For further details on the PCONF program see ´Configuring the Pluto device driver´.

If you do not wish to use the Pluto device drivers transfer the required driver onto the working disk.

The final stage is the modification of ASSIGN.SYS into a form suitable for your program. Full details of the purpose of this file can be found in the DR GSX-80 manual. Basically, it contains the names of the device drivers that you intend to use in your application. It contains normal characters and letters and so there is nothing special about it. It can be created or altered using a text editor such as Wordstar or Diskpen. Do not forget that the largest device driver that you wish to use must be the first entry in this table. If you are unsure as to how big these device drivers are you can find out using the STAT utility. By entering:

STAT DDPLUT/M.PRL<RET>

Providing STAT.COM is on the disk, the number of records used by the file will be displayed, this will indicate its length. If you want to know exactly how many bytes are used in the file, multiply the number of records by 128 and the result will be the file length in bytes.

A typical ASSIGN.SYS file will look like the following. Remember though that the names contained in it must be the names of GSX device drivers that are present on the specified disks.

```
01 A:DDPLUT/D ; a pluto device driver
10 A:DDPLOT   ; a plotter device driver
20 B:DDPRINT  ; a printer device driver
```

Note that in the above cases the .PRL is omitted from the filenames as this is assumed. There is nothing to stop you from specifying something like DDANY.ABC providing of course that it refers to a GSX device driver. The prefix 'DD' that you will see in most driver filenames stands for 'Device Driver' and is an aid to recognition only, it is not essential, in fact you can call them anything you like.

If special configuration programs have to be run for the device drivers (PCONF in the case of the Pluto) do this now.

Having gone through the above, you are now ready to run the application program.

Run the program by entering 'program name <RET>', for example 'GSXPROG<RET>', and the program will load and run. If you think the program is taking a long time to load, do not worry as the GSX loader has quite a bit of work to do before the program is executed. You should however see the GSX signon display, if this is so all is going well.

4. Introduction to the Pluto device driver

The Gemini Graphics Input/Output System (GIOS) for the Pluto colour card will allow you to run graphics application packages that have been designed for use with the Digital Research GSX 80 (Graphics system extension) interface software. The Pluto device drivers provide the code sections necessary to interpret the standard GSX graphics requests and display them via the Pluto card to a colour monitor.

4.1. CP/M Compatability

This device driver is designed to run under standard CP/M 80, it is not suitable for CP/M 86 systems or other operating systems.

4.2. Pluto compatability

This Device driver is intended for use on the following Pluto cards.

1. The 640 by 288, eight colour card without pallette.

2. The 768 by 288, eight colour card without pallette.

The device driver can be configured to run the above cards in hi res interlaced mode to give a resolution of 640 by 576 and 768 by 576 respectively.

No provision has been made for the addition of the Pluto Mini Pallette or the Pluto full Pallette. No guarantees can be made as to the suitability of this software when run on a IO Research PLUTO 2 or MEGARES system.

This software assumes that the Pluto card is configured to its default settings and is mapped to base port A0H.

5. Configuring the Pluto device driver

A program called PCONF.COM has been written to enable you to configure each of the supplied device drivers to the type of Pluto that you will be using. At the time of writing the two versions of the Pluto board are the 640 and 768 version. These figures refer to the number of pixels on the X axis. If you are unsure which Pluto you have, take a look at the EPROM chip near the centre of the Pluto board. It should have a label stuck over its top surface. If the label has 768 written on it then it refers to the type you have, if you can see no figures apart from the version no (v2.2 or similar) then you have the 640 version.

When run by entering 'PCONF<RET>' the program asks you which board you wish to use and asks for a single key reply. It then asks whether you wish to use high or low res, again a single key stroke is required.

You will then be asked to press the arrowed cursor keys in a certain sequence, this enables you to configure the keyboard input for use with various systems.

Having done this you will then see some text appear on the B/W screen and a rectangle appear on the colour screen. Using the arrowed keyboard keys move the bottom right hand corner of the square until all sides of the rectangle are equal. When you are happy that you are looking at a square and have measured all the sides to make sure that they are equal, press Return and the information concerning the aspect ratios of your particular screen will be given to the device drivers. This operation is necessary in order to ensure that GSX is given the correct aspect ratio of your screen, failure to do this will result in any circles being displayed as ovals and the suchlike.

Once you have given the details to the program it will then look on the disk currently being used. If it finds any of the three Pluto device drivers the information that you have just entered will be written into them. If all three are present then all will be altered.

6. Details of the Pluto device driver implementation

This section gives details of the workings of the Pluto device driver itself, it informs you of the capabilities of the software and the GSX functions that may be called. Due to the general nature of the GSX standard it is not practical to include routines to cover all of the specified GSX functions. However the Pluto GIOS will accept all function calls but of course some of these will simply return to the calling program with no action having been taken. An example of this, function 30, Input choice. This is designed to return a value from a choice device, but as no choice devices have been catered for the function returns immediately.

If you wish to learn more about the concepts behind GSX then please refer to the Digital Research GSX manual, as they are not covered in this document. However any device driver is split into 33 user callable functions and each function as contained in the Pluto device driver will be dealt with in order.

IMPORTANT.

The input parameter array (PTSIN) can of course be of any length that the applications programmer wishes, however it is this array that is copied by GSX into a GSX workspace area and scaled leaving the original alone. This GSX workspace is only capable of containing 73 coordinate pairs. If The Pluto GIOS is informed that an array is over 72 coordinate pairs long then an error is reported and the GIOS returns control back to the calling program. So remember keep the array PTSIN in the range 1 - 144 16 bit values (ie.72 XY pairs) and no anomolies will occur. The PTSOUT array need only be in the range 1 - 12 as this is the maximum that the GIOS will ever use in this Pluto version. All the other arrays CONTRL, INTIN, and INTOUT may be of any length that you wish.

Function 1. Open Workstation.

This function reads the desired device driver into memory if required and then calls function 1 of the device driver to inform it of a few default values that are required, but more importantly the device driver informs the GSX interface software (the GDOS) of the type and size of device that it is now dealing with. The values returned by the device driver may be used by the calling program by looking at the INTOUT and PTSOUT arrays as defined in the GSX documentation from DR. Here however are the values that the Pluto device driver returns:

INTOUT ARRAY:

1. Width of screen, may be 639 or 767 depending on how the driver was configured by PCONF.

2. Height of screen, may be 287 or 575 depending on whether hi or lo res was selected when PCONF was run.

3. Device coordinates flag. This will be set to 1 to indicate that this device is not capable of producing a precisely scaled image.

4. Aspect ratio value for X axis, this will normally be 10 as it will have been set by PCONF.

5. Aspect ratio value for Y axis, this value is used with the previous value to construct a ratio which may be something like 10:21 (lo res 768 Pluto). These ratios are set by the PCONF program which enables you to set up the device driver to work correctly on your individual screen, and thus may take on any value.

6. Number of character heights. As Pluto has only one font and is incapable of scaling this font, a value of one is returned from this function.

7. Number of linetypes. There are four linetypes supported.(see function 15)

8. Number of line widths. There is only one width of line available.

9. Number of marker types. 5 markers are available (see function 18).

10. Number of marker sizes. 1 again, as the Pluto font is used to generate markers and so cannot be scaled.

11. Number of fonts. 1, only - the Pluto Default font.

12. Number of patterns. This refers to the fill patterns available. There are 6 of these. (See function 24).

13. Number of fill hatch styles. There are also 6 of these. (See function 24).

14. Number of simultaneously displayable colours. 8 colours are available.

15. Number of generalised drawing primitives (GDP). These provide an easier way to generate some of the more popular graphics shapes such as bar fills and circles. The Pluto device driver caters only for bar fills. Please note that programs such as DR DRAW and DR GRAPH contain their own circle routines and will work perfectly well with this driver despite its lack of GDP's.

16-35
These elements give details of the GDP's, and will mostly be found to be -1 in value ie. GDP does not exist.

36. Colour capability flag. Set to 1 for yes.

37. Text rotation flag. Set to 1 for yes. Pluto can only rotate text in steps of 90 degrees and so there are 4 rotations to choose from.

38. Fill area capability flag. Set to 1 for yes.

39. Cell array operations flag. Set to 0 for no. The Pluto driver is not capable of Cell array ops. There is at the time of publication no commercially available program that uses these operations.

40. Number of available colours - 8.

41. Number of locator devices, set to 1 as a Pluto device driver has access to only 1 input device.

42. Number of valuator devices, none.

43. Number of choice devices, none.

44. Number of string devices, none.

45. Workstation type. Returns the value 3 to signify that the workstation is capable of both input and output.

The PTSOUT array is also set up to contain values relating to the heights and width of characters and lines (See DR manual) these values will have been translated into values greater than their Pluto equivalent by the GDOS. These values represent the relative widths and heights when working within the GSX 32,767 X 32,767 imaginary (virtual) graphics frame.

Function 2. Close Workstation.

This returns the driver into alpha mode and the screen is cleared.

Function 3. Clear Workstation.

This function simply clears the screen to all black. If the user is currently in alpha mode then the alpha cursor is replotted.

Function 4. Update Workstation

As all graphics commands to the Pluto device driver are actioned immediately this function takes no action before returning to the calling program.

Function 5. Escape Opcodes.

The Escape functions specified by the GSX standard are mostly concerned with the processing of text in alpha mode. Pluto does not have an alpha mode as such and because of this it has had to be simulated from within the GIOS software. To ensure that the two modes are not mixed it is not possible to access the alpha mode text commands whilst still in graphics mode and vice-versa, though all of the status and set value functions are always available regardless of mode. So remember do not try to display graphics in alpha mode or alpha text in graphics mode or you will be disappointed. This had to be done as the pluto commands are different for the two modes and would cause confusion if allowed to be mixed.

NB. The Pluto screen will always go into low resolution display when alpha mode is selected as text is much clearer. When graphics mode is once again selected the screen will clear and the appropriate resolution chosen depending on your selection in the configuration program PCONF.

The Escape operations are fairly self explanatory from the GSX manual but there are a few points that should be mentioned concerning the Pluto implementation.

While in graphics mode, the escape opcodes 4 - 15 are not available for use and will have no effect if called. All others are available.

When reverse video is selected, the character is displayed in the current text colour with a complementing background colour. White backgrounds were not used as it is sometimes difficult to see green or yellow text on a white background.

The alpha cursor is in fact a bold underline that complements itself onto the current position and therefore is non destructive. This approach allows one to be able to highlight the current cursor position without obliterating the contents of the character cell.

Escape operation 16, Inquire tablet status, will always return the value 0 'Tablet not available' regardless of the input device that the driver is using. This even applies when the default device is the digitiser pad itself. It is considered that this function will seldom be used and serves very little purpose and thus has been set to constantly return a zero value to the calling program.

Escape operation 17, Hard copy, also has no effect when called. As it is impossible to determine which hard copy device a user may have attached to the workstation the reproduction of displays on other devices apart from the CRT has been left as a job for other custom written device drivers.

When writing text in alpha mode a wraparound facility has been added to give you extra flexibility. The wraparound will not work if attempted using the cursor up, down, left, right operations.

Function 6. Polylines

The production of polylines is carried out according to the GSX standard.

Function 7. Polymarkers

These display markers in the current colour at points specified in PTSIN. The markers are copied from Pluto's text font. If possible it is advisable to plot markers before the connecting lines are added in a graph for example. This is due to the fact that the marker has a black surround and may erase part of any adjacent lines.

Function 8. Text.

This function deals with the output of text while the GIOS is in graphics mode. Alpha type text is not available from this function. In replace mode each character is plotted in the current text colour with a black surround.

Function 9. Filled area

This function performs its task as specified by the GSX standard but with some extra limitations. If a polygon is found to contain less than 3 vertices the fill is abandoned. Due to the method by which the fill is performed, it may occur that the fill is too complex for the algorithm to handle. When this occurs an error message will be output and control returned to the controlling program. The fill will error if the current fill line has to intersect more than 20 intersections with the fill outline.

Function 10. Display cell array.

Cell array operations are not available with this version of the Pluto device driver.

Function 11. Generalized drawing primitive.

This Version supports bar fills only. Although Pluto does have arc and circle generators these were not used as some problems were encountered in the zoom function of DR DRAW.

Function 12. Set character height.

Pluto is incapable of scaling its default text font and therefore only one character size is available. The same height values will be returned from the GIOS regardless of the values requested.

Function 13. Set character up vector.

The Pluto board is capable of four distinct rotation styles. These are rotations of 0, 90, 180, & 270 degrees. Any rotation value may be given to the GIOS from 0 to 3600 in intin 1. If the value given does not correspond with an exact rotation value then the lower rotation limit is taken. eg. if one were to pass 1200 in intin 1 corresponding to 120 degrees, then a rotation of 90 degrees would be selected and 900 returned in intout 1.

Function 14. Set colour representation.

This function is included for use in systems where a colour palette system is available. You would have to specify which of the many possible colours you wish to use, and typically you may choose up to 128 or greater from the range. However this Pluto device driver only uses the standard Pluto card and has no provision for the Pluto Palette extensions. As a result of this there are only 8 colours available, each of a fixed intensity. Because of this a call to this function will have no effect as colours may not be altered.

Function 15. Set polyline linetype.

There are four linestyles available. These conform to the GSX standard and are as follows.

1. Solid.
2. Dashed.
3. Dotted.
4. Dashed - dotted.

If the requested linestyle is out of range then solid is used.

Function 16. Set Polyline linewidth.

The Pluto device driver is capable of 1 linewidth, and this represents 1 pixel wide on the target screen. If this function is called, the virtual width of the line in NDC coordinates is returned and may be around 114 for a low res version. 114 in this case represents a linewidth of 1 in NDC units and not 114 in screen units. (For an explanation of NDC units see the GSX manual.)

Function 17. Set polyline colour index.

Line colours in the range 0 - 7 are available, any values above this default to white. See 'The GSX colour scheme' for details.

Function 18. Set polymarker type.

Five marker types are available, these are:

1. - '.'
2. - '+'
3. - '*'
4. - 'O'
5. - 'X'

Any requested marker type that is found to be out of range will default to 3, that is marker '*'.

Function 19. Set polymarker scale.

As characters from the default Pluto font are used as markers no scaling is possible.

Function 20. Set hardware text font.

There is only one font available in the Pluto Hardware. This function will have no effect.

Function 21. Set text colour index.

This determines the character colour for text in both graphics and alpha mode. Colours are in the range 0 - 7 (See the GSX colour Scheme). If a requested colour is out of range then white is selected. This function has no effect on the background colour of the character cell which is normally black except when in alpha mode and inverse video is selected.

Function 22. Set fill interior style.

You have four types of fill available:

1. Hollow. (outline shape only).
2. Solid. (whole of interior area filled with fill colour).
3. Pattern.
4. Hatch.

The pattern and hatch fills will superimpose a patterned fill over the existing elements on the screen, thus the background may be seen through the pattern.

If the requested style is not available then hollow is selected.

Function 23. Set fill style index.

Six patterns and six hatch styles are available, selection being made in the range 1 - 6. If the requested index is out of range then index 1 is selected.

The styles available are:

	Hatch	pattern
1	Vertical hatch	Large block
2	Horizontal hatch	Small block
3	+45 hatch	Fine spray
4	-45 hatch	Medium spray
5	Square cross harch	Thick spray
6	Cross hatch	Half tone pattern

The half tone pattern is a fill that uses 1 pixel on and 1 off when filling. If for example we fill a white background with a red polygon using half tone filling then the polygon interior will to all intents and purpose be pink. This ability can be used to coax more colours from the system than are available in the hardware.

Function 25. Set fill colour index.

Determines which of the 8 possible colours is to be used for subsequent fill operations.

Function 26. Inquire colour representation.

This is in effect a null function. As all colour intensities are preset in the Pluto system, a value representing maximum intensity (1000) will be returned for each colour requested.

Function 27. Return cell array definition.

Cell array operations are not available in this version of the Pluto GIOS.

Function 28. Inquire input locator.

The Pluto GIOS will respond to requests for the default input locator. This locator device will be either the keyboard, digitiser, or mouse depending on which of the three supplied drivers you are using. Please note that if requests are made to any device other than the default device (locator device 1) no action will be taken.

If you encounter problems when reading values from the devices then please refer to 'Setting up the external devices' which will enable you to ensure that all the required alterations have been made to the computer's system.

Function 29. Inquire valuator device.

This version of the Pluto device driver has no valuator capability.

Function 30. Inquire choice device.

This version of the Pluto device driver has no choice capability.

Function 31. Inquire string device

This version of the Pluto device driver has no string input capability.

Function 32. Set writing mode.

The four writing modes are all available:

1. Replace - will display the element in the required colour and will completely overlay preceeding elements.

2. Transparent - This mode is best used in the display of text. If you wish to display only the character without its black surround then use the transparent mode to achieve this.

3. XOR - In the display of text, lines, markers and polygons this mode will ensure that the element is logically XORed onto the screen thus complementing existing colours.

4. Erase - all elements displayed in erase mode will be black.

Function 33. Set input mode.

As this version only supports input from the default locator device, device 1 only is recognised. Either Sample or Request mode may be selected.

7. Setting up the external devices

This section will deal with the devices that will communicate with the Pluto device driver. These could be any one or all of the following.

1. Keyboard.

2. Digitiser pad.

3. Mouse.

7.1. Keyboard

The file DDPLUT/K.PRL is the Pluto device driver that uses the keyboard as its input device. When the device driver requires the user to input graphics data this will be done via the arrowed cursor keys. The values of the cursor keys will have been given to the device driver when PCONF was run and this allows the software to be set up for a variety of keyboards. As the keyboard is accessed using standard operating system routines this version should work on a variety of CP/M 80 computers. No further setting up is required.

7.2. Digitiser pad

The file DDPLUT/D.PRL is the device driver that uses a Calcomp 2000 digitiser pad with the pen option as the default input device.

The digitiser pad will have to be set up correctly before it will work with the system.

The following must be observed:

1. The digitiser is powered by either the optional external Power supply unit available from Calcomp or via the serial cabling from the computer. If the external PSU is chosen please refer to the manufacturers instructions for installation advice. If you wish to power the pad directly from the computer this may be done, but it is recommended that an authorised dealer handle the work as knowledge of the computer system and soldering expertise is required.

   The pad requires a 12V DC supply which may be taken (In the Gemini or Quantum system) from the light pen socket. A 12V supply from this source should then be connected to pin 24 of the RS232 external connection socket. If the digitiser is to be powered in this fashion then link B2 should be bridged inside the digitiser itself.

   NB. In the case of the Gemini MultiNet colour workstation the digitiser socket at the rear of the chassis has been modified to supply the necessary power requirements.

2. The digitiser should be set up to run under the following operating conditions.

   Run mode.

   Metric binary data.

   125 pairs/sec

   Please see the manual for details on these configurations.

3. The rates and conditions under which the digitiser communicates with the host computer will also have to be specified. This process is called 'Setting up the UART parameters'. It concerns the number of data bits to transmit, the rate of transmission (BAUD rate) and other such technical considerations.

   Providing that the digitiser and the computer have identical parameters then transmission will be sucessful.

   The digitiser I/O port is assumed to be at the default port for serial I/O which is B8 in the Gemini system.

7.2.1. Sample settings for the uninitiated

The following proceedure will ensure that the computer and digitiser are correctly set ready for use. The following instructions will only apply to those owning a Gemini/Quantum system.

1. Place a copy of the utility program 'CONFIG.COM' onto your working GSX disk and run it by typing 'CONFIG<RET>'. You will be presented with a menu of options. Press the '4' key to select the UART parameters option. Following the instructions presented to you onscreen change the settings to the following.

   7 Data bits

   2 stop bits

   9600 BAUD

   Even parity

   On board memory off

   RS232 selected

   RTS & DTR off.

Once you have done this then press '0' to write the changes to disk. This disk now holds a copy of the operating system that will suit the digitiser once it has been set itself.

Look at the rear of the digitiser and you will see a blanking plate held on by two screws. Undo these screws and remove the plate. Inside the cavity you will see a bank of three switch housings each containing 9 switches. Now set these switches to the following settings, 'O' means open and 'C' means closed. The open position will be marked on the switch housing.

Switch 1	Switch 2	Switch 3
1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9
O O C O C C C O O	C C O C C C O C C	O O O O O O O O C

The above setting correspond to the computer's UART settings and those required by the pluto device drivers.

7.3. Mouse

The mouse specified for this system is the MSC M-2 Optical mouse. It requires no hardware alteration in order to run, but the system software on the GSX working disk may need to be altered. You will need to run the 'CONFIG' program as for the digitiser system. But this time the required settings are:

8 data bits

2 stop bits.

No parity

1200 BAUD

On board memory off.

RS232 selected

RTS & DTR off.

7.4. General

From the above it can be seen that interfacing to external devices can be somewhat difficult. The Pluto device driver software makes no provision for setting up the UART parameters to suit the device as this is assumed to have been done by the user. If you are having difficulty then first make sure that everything else is alright by running a program using the keyboard based device driver to ensure that it is the locator device that is causing the trouble. The keyboard routines need very little setting up and are generally fault free.

If you still are having problems with the digitiser system then check that power is getting to the digitiser. If the computer is supplying the power then ensure that pin 24 of the RS232 connecting lead has a voltage level of +12V at the digitiser end, and that link M2 has been fitted. Also ensure that there is a good connection between the pen and the pad.

The digitiser will return coordinates to the system along with a terminating character according to the GSX standard. The returned characters are ASCII <SPACE> decimal 32 if the pen is pressed down in the live area of the pad ie. the lower 3/4 of the pad area. An ASCII '"' will be returned if it is pressed down in the top 1/4 of the pad area.

The mouse will return coordinates along with the following:

Left button - ASCII <SPACE> decimal 32.

Middle button - ASCII '"' decimal 33.

Left button - ASCII '#' decimal 34.

8. Using the Pluto drivers with DR-DRAW and DR-GRAPH

At the time of writing available software to run under GSX 80 is somewhat limited. This situation is expected to improve once the GSX standard has become established. However, the two DR products DRAW and GRAPH are available fore use.

These two programs have been fully tested using the Pluto GIOS and will work if the installation notes have been followed.

When using DR DRAW you will be asked to press 'PICK' and 'DONE' and to move the graphics cursor using the arrowed keys. Depending on the device driver being used these actions will take a different form.

If using the keyboard - 'Pick' = Press space bar once.

'Done' = Press RETURN

arrowed keys will move cursor 1 pixel.

Pressing the 'SHIFT' key while also pressing the arrowed keys will move the cursor 30 pixels. (This is the fast move facility).

If using the digitiser - 'Pick' is selected by pressing the pen's nib down onto the pad while the screen cursor is still in the 'live' area. (ie not off the screen)

'Done' is selected by moving the pen to the top of the pad until the screen cursor ceases movement. This means that the pen is now out of the 'live' screen area. Press the pen down once and 'Done' will be selected.

In short:
Pressing the pen down in the top quarter of the pad area selects 'Done'.

If using the Mouse - 'Pick' is selected by pressing the first button.

'Done' is selected by pressing the middle button.

The third button is spare.

9. Details of the additional plotter device drivers

In addition to the Pluto device drivers and those supplied by DR, Gemini have included 3 drivers for some popular plotters. These are:-

1. DDPIXY3.PRL - A driver for the Mannesman Tally PIXY3, 3 pen colour plotter.

2. DDMP1000.prl - A driver for the Graphtec MP-1000 6 pen plotter.

3. DDDXY880.PRL - A driver for the Roland DXY-880 8 pen plotter.

9.1. Communicating with the plotter

All data is output to the plotter via the CP/M list device. These drivers alter the iobyte at address 3 to inform the operating system that the list device is to be treated as serial with hardware handshake. All of these plotters support this mode and should be set up accordingly. The other serial comms parameters (eg. BAUD rate) should be matched to your operating system by the alteration of the plotter dip switches. The Close Workstation call restores the iobyte back to its original value.

If, however, the parallel versions of these plotters are to be used then the run time alteration of the iobyte can be disabled by changing the value of a single byte in the device driver.

This operation is best carried out using DDT or Gemdebug.

When loaded under DDT the patch bytes can be found at:

DDDXY880.PRL - Patch byte at address 291F HEX

DDMP1000.PRL - Patch byte at address 2568 HEX

DDPIXY3.PRL - Patch byte at address 24A3 HEX

You will find that this byte has been set to the value 'S' ie. 53 HEX. This is the SERIAL status flag and if it is altered no operations will occur on the iobyte and all plotter output will be directed to the standard CP/M list device without any changes in communications protocols. We suggest that you change it to 'P' (50 HEX), for Parallel, so that it can be found again if necessary.

Once the patch byte has been altered exit DDT and save the altered memory image of the device driver using the SAVE command.

9.2. GSX implementation of plotter drivers

The GSX function calls implemented in these plotter drivers are as follows.

1. Open Workstation.

2. Close Workstation.

3. Clear Workstation.

5. Escape - 1. Inquire addressable character cells.
   There is no alpha mode.

6. Polyline.

7. Polymarker.

8. Text.

9. Filled area. - Hollow and solid fills implemented, no patterns and hatching.

11. GDP'S - Bar and arc are implemented. (Hatching implemented on Roland)
    Pie slices and Circles implemented on Roland.

12. Set character height.

13. Set character up vector.

15. Set polyline linetype.

17. Set polyline colour index.

18. Set polymarker type.

19. Set polymarker scale.

20. Set polymarker colour index.

22. Set text colour index.

23. Set fill interior style. - hollow & solid fills only, with hatching on the Roland version.

25. Set fill colour index.

9.3. Plotter pen selection

The GSX colour values are as follows:

0 - Black. 1 - Red. 2 - Green. 3 - Blue. 4 - Cyan. 5 - Magenta. 6 - White.

For as faithful a reproduction of the original material this pen layout should be kept. In the case of plotters with less than 8 pens, if a requested colour is out of range then the highest value available is selected.

In the case of the PIXY3 device driver any elements specified in black default to the colour of the third pen. This has been done as there are only 3 pens available and when used in conjuction with drawing packages that draw on a predominantly black background, the black pen would be largely redundant.